

1 REMARKS

2 Status of the Claims

3 Claims 34-35, 37-40, 42-44, 46, 49-51, 54, 56-58, and 60-61 are pending in the present
4 application, Claims 1-33, 36, 41, 45, 47, 48, 52, 53, 55, and 59 having been previously canceled.
5 Claims 34, 37, 39, 42, 50, 54, 56, 60 and 61 have been amended to more clearly define the invention.

6 Claims Rejected Under 35 U.S.C. § 103(a)

7 The Examiner has rejected Claims 34, 35, 37-40, 42-44, 46, 49-51, 54, 56-58, and 60-61
8 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,981,956 (Stern) in view of
9 U.S. Patent No. 5,754,291 (Kain).

10 As amended, each independent claim requires that a single detector be used to acquire a
11 plurality of *non-overlapping* spectrally dispersed *two-dimensional* images. Stern acquires a plurality of
12 spectrally dispersed two-dimensional images using a different detector for each different spectrum (i.e.,
13 one detector for red images, one detector for blue images, etc.). Kain uses a single detector to acquire
14 either a full spectrum or full color two-dimensional image, or a spectrally dispersed *one-dimensional*
15 image. Applicants admit that this aspect of Kain is not clearly disclosed; however, a reasoned review
16 of Kain's disclosure by the artisan of ordinary skill will make this distinction clear.

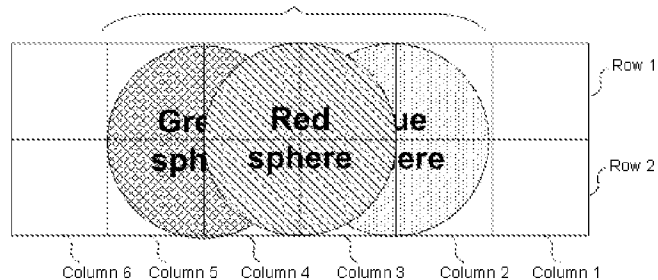
17 Kain specifically suggests using a prism to spectrally disperse light to be acquired by a detector.
18 Kain notes that when light is spectrally dispersed, one axis of the detector provides spatial information,
19 and the other axis provides wavelength information. That is not a two-dimensional image; a two-
20 dimensional image provides spatial information along *both* axes of a detector having two axes (i.e., an
21 X-axis and a Y-axis). In the embodiment employing spectral dispersion, Kain is teaching that you
22 acquire a spectrally dispersed one-dimensional image (i.e., a line). If you want to acquire a two-
23 dimensional image, you must move the sample or the optics to acquire another one-dimensional image,
24 and then build up a two-dimensional image using a plurality of one-dimensional images.

25 Assume for a moment that Kain did not specifically teach that one-dimensional images were
26 acquired (i.e., assume that Kain stated that *both* axes of the detector provided spatial information, and
27 one axis provided wavelength information). Such an embodiment would still not achieve a plurality of
28 non-overlapping spectrally dispersed *two-dimensional* images, because such an embodiment would
29 lead to overlapping images, because one axis of the detector is combining wavelength *and* spatial
30 information.

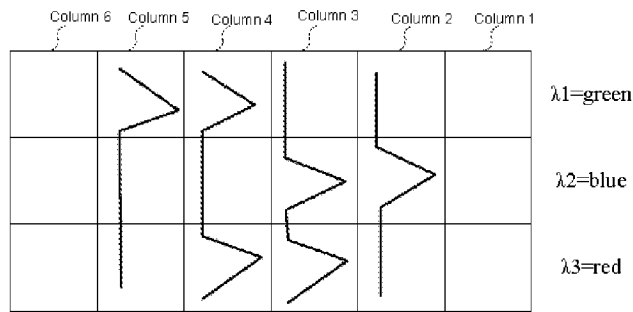
1 Indeed, blurred and overlapping two-dimensional imagery is a known limitation when using a
2 prism to disperse light for two-dimensional imaging. If a detector is configured to determine spectral
3 intensity (with one axis of the detector being dedicated to spectral intensity, and the other axis being
4 dedicated to spatial information) or a one-dimensional spectrally dispersed image (with one axis of the
5 detector being dedicated to spectral dispersion and the other axis being dedicated to spatial
6 information), as opposed to acquiring two-dimensional images, this characteristic of a prism is not a
7 drawback. However, if one wishes to obtain non-overlapping spectrally dispersed *two-dimensional*
8 images using a prism, the blurring effect of the prism is a nuisance. In the specification as filed, one
9 disclosed embodiment employs a prism, and post image acquisition processing (deconvolution) is
10 required to address this issue. As amended, the pending claims are directed to disclosed embodiments
11 where dichroic filters are employed instead of a prism, such that the post image acquisition processing
12 (deconvolution) is NOT required. If the orientation of each dichroic filter is carefully controlled, one
13 can ensure that the different spectral images appear on different regions of the detector. That aspect of
14 the invention is not disclosed by Kain or Stern.

15 It may be helpful to consider how a detector/optical system would respond to three different
16 color spheres that overlap one another (this can be considered to be a single probe including three
17 different optical signaling components):

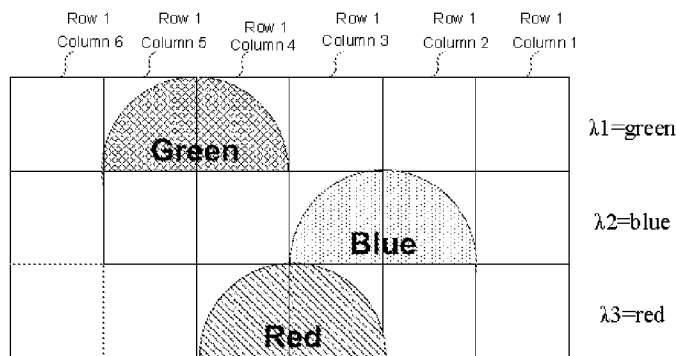
18 *Light collected from 3 overlapping spheres at the same time*



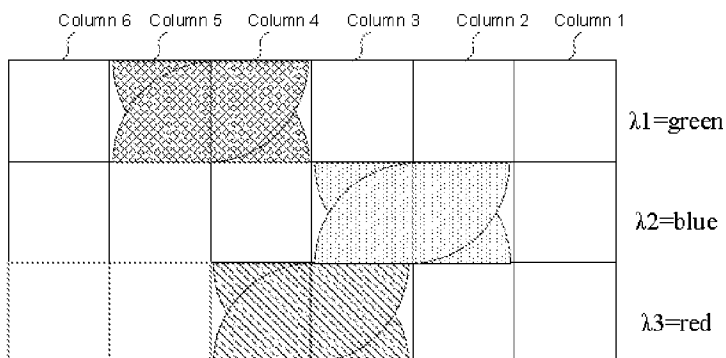
25 When a prism is used simply to disperse the wavelengths and record intensity (i.e., a non-
26 imaging detector), a detector would acquire the following:



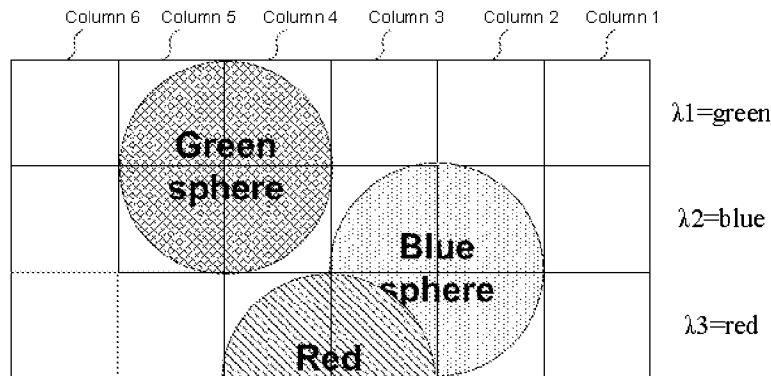
When a prism is used to disperse the wavelengths along one axis and the other axis is used for spatial information (i.e., single line scanning; a one-dimensional image), a detector would acquire the following:



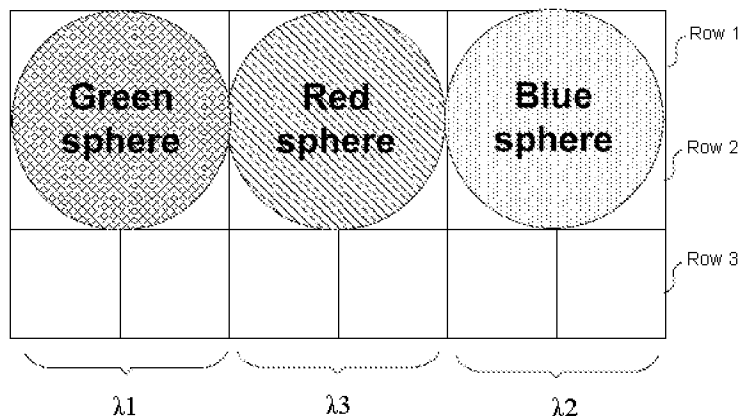
When a prism is used to disperse the light, and the detector is configured such that one axis attempts to preserve spatial information *and* to provide wavelength information, and the other axis is used for spatial information (i.e., attempting to combine two-dimension imaging with spectral dispersion), there are several possibilities, depending on how the detector is configured to use the same axis for both spatial information and wavelength information. In a first possibility, columns are preserved and rows are combined.



In a second possibility, columns are preserved and rows are allowed to disperse downward into the next row of the detector.



In contrast, applicants filter stack configurations (i.e., FIGURES 14 and 18) enable complete two-dimensional images to be simultaneously displayed on one detector without overlap, as shown below:



The artisan of ordinary skill in the art of optics will readily recognize that Kain's apparatus cannot achieve three non-overlapping two-dimensional images of spheres where the sample is three overlapping spheres of different colors, simply because the dispersion element disclosed by Kain is not equivalent to applicants' dispersion element, which is specifically configured to be positioned such that light exits the different portions of the dispersion element at the angles required to prevent overlap of the different spectral images on the detector. Kain and Stern simply do not teach or suggest such a dispersion element; thus the combination of Kain and Stern does not achieve an equivalent.

For the reasons discussed above, each independent claim (as amended) distinguishes over the cited art. Clearly, dependent claims are patentable for at least the same reasons as the claims from

1 which they depend. Accordingly, the rejection of Claims 34, 35, 37-40, 42-44, 46, 49-51, 54, 56-58,
2 and 60-61 under 35 U.S.C. § 103(a) as being unpatentable over Stern in view of Kain should be
3 withdrawn.

4 The Examiner is thus requested to pass the present application to issue in view of the remarks
5 submitted above. If there are any questions that might be addressed by a further telephone interview,
6 the Examiner is invited to telephone the undersigned attorney, at the number listed below.

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8 Respectfully submitted,

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13 Registration No. 44,832

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